

1

DANIEL H. WAGNER, ASSOCIATES

(758)

H. R. RICHARDSON, MANAGER  
BARRY BELKIN, TECHNICAL DIRECTOR  
SCOTT S. BROWN, SR. ASSOCIATE  
ROBERT P. BUEMI, SR. ASSOCIATE  
LARRY K. GRAVES, SR. ASSOCIATE  
WALTER R. STROMQUIST, SR. ASSOCIATE  
CAROL R. HOPKINS, SR. SOFTWARE ANALYST  
KATHLEEN M. SOMMAR, SR. SOFTWARE ANALYST  
RICHARD H. CLARK, SOFTWARE ANALYST

PAOLI OFFICE

STATION SQUARE ONE  
PAOLI, PENNSYLVANIA 19301

(215) 644-3400

(800) 345-1252

December 19, 1985

HOTRS., PAOLI, PA  
DANIEL H. WAGNER, PRES  
  
YORKTOWN OFFICE  
1807 GEO WASHINGTON HWY  
YORKTOWN, VA 23692  
(804) 898-7700  
JOSEPH H. DISCENZA, MGR  
  
SUNNYVALE OFFICE  
1270 OAKMEAD PARKWAY  
SUITE 314  
SUNNYVALE, CA 94086  
(408) 732-8393  
STANLEY J. BENKOSKI, MGR  
  
WASHINGTON OFFICE  
SUITE III  
501 CHURCH STREET, N.E.  
VIENNA, VA 22180  
(703) 938-2032  
LAWRENCE D. STONE, MGR  
BERNARD J. MCCABE, FIELD DIR

MEMORANDUM REPORT

To: Office of the Chief of Naval Operations (Op-654)  
Attn: CDR J. D. Harrison Contract No. N00014-83-C-0110  
  
From: W. R. Stromquist  
  
Subject: Final Report on DHWA Modeling Efforts for NNWS, FY 1985

This firm has made technical contributions in five areas under the subject contract.

Our efforts in each area have been reported separately in a series of technical memoranda.

The purposes of this final report are to describe briefly the work done in <sup>five areas</sup> each area, and to list the technical documents delivered under this contract. *The areas are:*

The work of this contract was performed by L. K. Graves, S. S. Brown, R. P. Buemi, and R. H. Clark, under the direction of Dr. Graves.

1. Battle Group ASW Models ;

*next page*

References [a] and [b] constitute an SCP for the incorporation of Battle Group ASW Contract Processing into NNWS. These memoranda represent a completion of the plan originally described in reference [c]. After the preparation of references [a] and [b], funding cuts made it unlikely that the recommendations made could be implemented in the near term. Accordingly, we developed a "first-order" model which could give NNWS a significant capability to model BG ASW contact prosecution, and yet could be implemented within a realistic near-term level of effort. The first-order model is described in references [d], [e], and [f].

DISTRIBUTION STATEMENT A

Approved for public release

Distribution Unlimited

CONSULTANTS OPERATIONS RESEARCH, MATHEMATICS, SOFTWARE DEVELOPMENT

86 2 18 168

AD-A165 147

NTC FILE COPY

## 2. Blue-Out Effects

Our recommendations for incorporation of Blue-Out effects in NNWS are contained in reference [g], building an earlier work in references [h] and [i]. Although it is not as exhaustive as a formal SCP, we believe that reference [g] is sufficiently detailed to enable a straightforward incorporation of blue-out effects into the simulation.

## 3. Red ASW and Updated VP Search Models

Reference [j] is an SCP containing our recommendations for modeling Red fixed-wing air assets in NNWS. It builds on earlier work described in references [k], [l], [m], and [n], and on our best understanding of the issues raised in reference [o].

The Red ASW model made use of the analogy to Blue VP search operations. As our earlier work on VP search had not been implemented in NNWS, we expanded the Red ASW task to include updating of our VP-search work and support for its full implementation. Our work on VP search under the current contract is documented in references [p] and [q]. It has now been fully implemented.

## 4. SOSDET Modification

References [r] and [s] constitute an original and expanded version of an SCP to modify SOSDET to eliminate problems that had been observed by STRATSIM. These references built on the preliminary analysis of reference [t]. The changes recommended in the expanded SCP have now been fully implemented in NNWS.

## 5. Detection Opportunity Scheduling

References [u] and [v] are, respectively, an SCP and subsequent analysis concerning scheduling of detection opportunities. With the changes recommended, detection events will execute in NNWS only when the units involved are actually within the maximum detection range, without regard to earlier predictions.

DTIC  
ELECTE  
MAR 10 1986  
S D

## 6. Status Reports

For completeness, the four status reports prepared during FY 1985 are listed as references [w] through [z].

*Walter Stromquist*

Walter R. Stromquist

WRS/cmm

- [a] System Change Proposal for Battle Group ASW Contact Processing in NNWS, Daniel H. Wagner, Associates Memorandum Report to the Office of the Chief of Naval Operations (Op-654), by L. K. Graves and R. P. Buemi, September 18, 1984 (758).
- [b] VS Detection and Coverage within the Proposed Battle Group ASW Contact Processing Model, Daniel H. Wagner, Associates Interim Memorandum to the Office of the Chief of Naval Operations (Op-654), by L. K. Graves, October 11, 1984 (758).
- [c] NNWS Preliminary Design Description for Battle Group ASW Contact Processing, Daniel H. Wagner, Associates Interim Memorandum to Office of the Chief of Naval Operations (Op-654), by L. K. Graves, June 14, 1984 (758).
- [d] Preliminary Design for Battle Group ASW Contact Prosecution, Daniel H. Wagner, Associates Memorandum Report to Office of the Chief of Naval Operations (Op-654), by L. K. Graves, January 14, 1985 (758).
- [e] Interactions Between the Submarine Anti-Battle Group Engagement Model and the Proposed Battle Groups ASW Contact Processing Model, Daniel H. Wagner, Associates Interim Memorandum to Office of the Chief of Naval Operations, by L. K. Graves, February 5, 1985 (758).
- [f] The Incorporation of Battle Group ASW Contact Prosecution in NNWS, Daniel H. Wagner, Associates Memorandum Report to Office of the Chief of Naval Operations (Op-654), by L. K. Graves, March 5, 1985 (758).
- [g] Recommendations for Modeling Blue-Out in the Naval Nuclear Warfare Simulation, Daniel H. Wagner, Associates Interim Memorandum, by S. S. Brown and L. K. Graves, February 15, 1985 (758).
- [h] Incorporation of Blue-Out into NNWS Models for Gaining Acoustic Detection, Daniel H. Wagner, Associates Interim Memorandum to Office of the Chief of Naval Operations (Op-654), by S. S. Brown, January 9, 1985 (758).
- [i] Preliminary Design for Incorporating Blue-Out into Naval Nuclear Warfare Simulation, Daniel H. Wagner, Associates Interim Memorandum to the Office of the Chief of Naval Operations (Op-654), by R. P. Buemi, September 20, 1984 (758).
- [j] System Change Proposal Concerning Red Fixed-Wing Air in the Naval Nuclear Warfare Simulation (U), Daniel H. Wagner, Associates Interim Memorandum to Office of the Chief of Naval Operations (Op-654), by R. P. Buemi, November 7, 1984, Secret (758).



*on file*

Availability Codes

Dist

Avail and/or  
Special

A-7

- [k] Candidate PL-1 Code in Support of the System Change Proposal on VP Search and Detection in NNWS, Daniel H. Wagner, Associates Memorandum to the Office of the Chief of Naval Operations (Op-654), by R. P. Buemi and C. R. Hopkins, July 26, 1984 (758).
- [l] Red ASW for the Naval Nuclear Warfare Simulation (U), Daniel H. Wagner, Associates Interim Memorandum to Office of the Chief of Naval Operations (Op-654), by R. P. Buemi, March 30, 1984 (758), Secret.
- [m] Red Fixed-Wing Air ASW Search and Detection in the Naval Nuclear Warfare Simulation, Daniel H. Wagner, Associates Interim Memorandum to Office of the Chief of Naval Operations (Op-654), by R. P. Buemi, June 8, 1984 (758).
- [n] Red Search Strike Forces in NNWS (U), Daniel H. Wagner, Associates Interim Memorandum to Office of the Chief of Naval Operations (Op-654), by R. P. Buemi and L. K. Graves, June 27, 1984 (758), Secret.
- [o] Questions on Red ASW (U), Daniel H. Wagner, Associates Memorandum to the Office of the Chief of Naval Operations (Op-654), by R. P. Buemi, July 30, 1984, Secret (758).
- [p] Updated System Change Proposal Concerning VP Search and Detection in the Naval Nuclear Warfare Simulation, Daniel H. Wagner, Associates Interim Memorandum to Office of the Chief of Naval Operations (Op-654), by R. P. Buemi and C. R. Hopkins, July 6, 1984 (758).
- [q] Updated PL/I Code for the PLACPAT and BUOYPOS Routines, Daniel H. Wagner, Associates Interim Memorandum to Office of the Chief of Naval Operations (Op-654), by C. R. Hopkins, July 10, 1984 (758).
- [r] System Change Proposal to Remove Anomalous Estimates from the SOSDET Procedure of NNWS, Daniel H. Wagner, Associates Interim Memorandum to Office of the Chief of Naval Operations (Op-654), by C. R. Hopkins, July 27, 1984 (758).
- [s] Revised System Change Proposal to Remove Anomalous Estimates from the SOSDET Procedure of the Naval Nuclear Warfare Simulation, Daniel H. Wagner, Associates Interim Memorandum to the Office of the Chief of Naval Operations (Op-654), by C. R. Hopkins, September 11, 1984 (758).
- [t] Modifications to SOSDET to Alleviate Anomalous Results, Daniel H. Wagner, Associates Memorandum to Office of the Chief of Naval Operations (Op-654), by R. P. Buemi, July 6, 1984 (758).
- [u] System Change Proposal for NNWS Detection Opportunity Scheduling, Daniel H. Wagner, Associates Interim Memorandum to Office of the Chief of Naval Operations (Op-654), by L. K. Graves, July 17, 1984 (758).
- [v] Delayed Scheduling of Detection Opportunity Event in NNWS, Daniel H. Wagner, Associates Interim Memorandum to Office of the Chief of Naval Operations (Op-654), by S. S. Brown and L. K. Graves, November 14, 1984 (758).
- [w] Status of DHWA Modeling Efforts for NNWS, Daniel H. Wagner, Associates Interim Memorandum to the Office of the Chief of Naval Operations (Op-654), by L. K. Graves, July 18, 1984 (758).

- [x] Status of Wagner, Associates Modeling Efforts for the Naval Nuclear Warfare Simulation, Daniel H. Wagner, Associates Interim Memorandum to Office of the Chief of Naval Operations (Op-654), by L. K. Graves, October 16, 1984 (758).
- [y] Status of DHWA Modeling Efforts for NNWS (January 1985), Daniel H. Wagner, Associates Interim Memorandum to Office of the Chief of Naval Operations (Op-654), by L. K. Graves, January 16, 1985 (758).
- [z] Status of DHWA Modeling Efforts for NNWS (March 1985), Daniel H. Wagner, Associates Interim Memorandum to Office of the Chief of Naval Operations (Op-654), by L. K. Graves, March 11, 1985 (758).